JC10 Rec'd PCT/PTO 13 FEB 2002

*FORM PTO-1390 (REV 11-2000) OFFICE — U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK

ATTORNEY'S DOCKET NUMBER: 449122021200

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. § 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): 10/049459 Not yet assigned

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/02436	July 19, 2000	August 13,1999

TITLE OF INVENTION

CIRCUIT ARRANGEMENT FOR OPERATION OF A RELAY

APPLICANT(S) FOR DO/EO/US

Martin ROSSBACH

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☒ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application under PCT Article 19 (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information: 1) Application Data Sheet; 2)Int'l Search Report; 3) IPER; 4) Return receipt postcard.

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D.C. on February 13, 2002.

Melissa Gatton

Melissa Gatton

dc-302561

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY DOCKET NO.
Not yet assigned 10/049459	PCT/DE00/02436	449122023500

21. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):

	CALCULATIONS PTO USE ONLY
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1,000.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $890.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $710.00	
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provision of PCT Article 33(1)-(4) $690.00	
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00	

ENTER APPROPRIATE BASIC FEE AMOUNT =				$890.00	
☐ Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				$0	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =		x $18.00	$0	
Independent claims	- 3 =		x $80.00	$0	
☐ MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $270.00	$0	
TOTAL OF ABOVE CALCULATIONS =				$890.00	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by ½.				$0	
SUBTOTAL =				$890.00	
☐ Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$0	
TOTAL NATIONAL FEE =				$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00 per property** +				$0	
TOTAL FEES ENCLOSED =				$890.00	
				Amount to be refunded:	$
				charged:	$

a. ☒ Please charge my **Deposit Account No. 03-1952** (referencing Docket No. 449122023500) in the amount of $930.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

b. ☒ The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment to **Deposit Account No. 03-1952** (referencing Docket No. 449122023500).

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Kevin R. Spivak
Morrison & Foerster LLP
2000 Pennsylvania Avenue, N.W.
Washington, D.C. 20006-1888

SIGNATURE

Kevin R. Spivak
Registration No. 43,148

February 13, 2002

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D.C. on February 13, 2002.

Melissa Garton

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Martin ROSSBACH

Serial No.: Not yet assigned

Filing Date: February 13, 2002

For: CIRCUIT ARRANGEMENT FOR OPERATION OF A RELAY

Examiner: Not yet assigned

Group Art Unit: Not yet assigned

PRELIMINARY AMENDMENT

BOX PCT
Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination on the merits, please amend this application as follows:

In the Specification:

Page 1 before the first paragraph, please delete the following:

Description

Page 1, between lines 4 and 5, please insert the following headings and paragraph:

CLAIM FOR PRIORITY

This application claims priority to International Application No. PCT/DE00/02436 which was published in the German language on July 19, 2000.

TECHNICAL FIELD OF THE INVENTION

Please replace the paragraph beginning line 5 of page 1 with the following rewritten paragraph:

The invention relates to a circuit arrangement for operation of a relay, and in particular, to a current having a timer unit which provides a relay switching-on current for a time which is predetermined by the timer unit and which provides a relay holding current, which is less than the relay switching-on current for a subsequent holding period.

Page 1, between lines 11 and 12, please insert the following heading:

BACKGROUND OF THE INVENTION

Please replace the paragraph beginning line 12 of page 1 with the following rewritten paragraph:

U.S. Patent No. 5,107,391 discloses a circuit arrangement in which the current flowing through at least one relay (i.e. its field coil) is controlled by means of an electronic switch in the form of a field-effect transistor. When it is switched on, the relay is supplied with a holding current throughout its holding period. The magnitude of the holding current is governed by the duty ratio of electrical pulses which drive the electronic switch. The temperature of the relay is measured by means of a temperature sensor, and the voltage which is applied to the field coil of the relay is measured by means of a voltage sensor. These measurement variables, as well as information which is stored in a function memory and relates to the nominal values of the relay, are used to define the duty ratio of the pulses, and thus to define the magnitude of the holding current. The relay nominal values must therefore be known in order to properly operate the circuit. A voltage change which occurs on the field coil of the relay is used to identify that the relay has been switched on, and causes a timer unit to be started. This timer unit uses a continuous pulse to switch on the electronic switch, so that a switching-on current flows which is sufficient to ensure that the relay is switched on. Once the time which is predetermined by the timer unit, and which must be longer than the time required for the relay that is being used to be switched on has elapsed, the continuous pulse ends, and the holding current, which is governed by the duty ratio of the pulses, still flows through the relay.

Page 2, between lines 27 and 28, please insert the following heading:

SUMMARY OF THE INVENTION

Please replace the consecutive paragraphs beginning at line 28 of page 2 with the following rewritten paragraphs:

One embodiment of the invention discloses a circuit arrangement for operation of a relay. Discrepancies in the relay from its nominal values have no effect on the magnitude of the switching-on current and holding current, and need not be taken into account with regard to the size of the components in the circuit. Furthermore, it is possible to use the circuit, with one and the same relay, from operating voltages of different magnitude.

In this embodiment, the relay switching-on current and the relay holding current are constant currents, which are supplied from at least one constant current source. A constant current is thus used both as the relay switching-on current and as the relay holding current, whose magnitude is not influenced either by discrepancies in the relay from its nominal values or by operation of the circuit arrangement from operating voltages of different magnitude.

Please replace the consecutive paragraphs beginning at line 24 of page 3 with the following rewritten paragraphs:

In another embodiment of the invention, the circuit arrangement includes, for example, a first constant current source which provides the relay holding current during the time which is predetermined by the timer unit and during the subsequent holding period, and a second constant current source which provides a constant current, which is superimposed on the relay holding current in order to form the relay switching-on current, during the time which is predetermined by the timer unit. This has the advantage that relatively simple constant current sources can be used, whose constant currents need not be variable.

In one aspect of the invention, a switch, which is closed during the time that is predetermined by the timer unit, can advantageously be located in the current path of the constant current provided by the second constant current source. Once this time has elapsed, the switch is opened, thus making it easy to switch between the relay switching-on current and the relay holding current.

In another aspect of the invention, the timer unit and/or the switch may require an auxiliary voltage. A voltage drop across at least one electrical component that is connected in series with one of the constant current sources can advantageously be used for this auxiliary voltage.

In one embodiment, a resistor may be used as the electrical component. Since the current flowing through the resistor is constant, the voltage which is dropped across this resistor is also constant, and may be used as an auxiliary voltage.

In another embodiment, a zener diode can advantageously be used as the electrical component. A zener diode has the advantage that the voltage drop which occurs across it is constant even when the current flowing through the zener diode changes. By way of example, a situation may arise during operation of a relay which requires a change to the switching-on current and/or holding current, and hence appropriate changes to the constant currents. The advantage just mentioned is also applicable when series-connected diodes are used as electrical components.

Page 4, between lines 35 and 36, please insert the following heading:

BRIEF DESCRIPTION OF THE DRAWINGS

Please replace the paragraph beginning line 36 of page 4 with the following rewritten paragraph:

Figure 1 shows an exemplary embodiment of a circuit arrangement according to the invention for operation of a relay.

Figure 2 shows a diagram of the state of elements in the circuit arrangement, plotted against time.

Page 5, between lines 6 and 7, please insert the following heading:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please replace the consecutive paragraphs beginning line 7 of page 5 with the following rewritten paragraphs:

The circuit arrangement 1 illustrated in Figure 1 for operation of a relay is connected in series with a field coil SP of a relay. A voltage U is applied to the series circuit. The voltage U is a switching voltage, that is to say application of the voltage U is intended to cause the relay to switch. At the same time, the voltage U is used as the operating voltage for the circuit arrangement and the relay. As long as no switching voltage U is applied, the circuit arrangement is in a quiescent state with no current flowing, and a switch SCH is closed.

When the switching voltage U is applied, the circuit arrangement starts to operate. A constant current source KS1 drives a constant current IK1 through a zener diode ZD and through the field coil SP of the relay. Since the switch SCH is closed, a constant current source KS2 also drives a constant current IK2 through the switch. This current is added to the constant current IK1 at a node 2; a current whose magnitude is (IK1 + IK2) flows, as a

coil current ISP, through the field coil SP of the relay. The constant current source KS1 is designed such that it supplies a constant holding current. The constant current source KS2 supplies the difference to make up the necessary switching-on current for the relay; in this case, the difference is of precisely the same magnitude as the relay holding current. The switching-on current now flows through the field coil SP of the relay and the relay pulls in, that is to say it switches. The constant current IK1 which is flowing through the zener diode ZD results in an auxiliary voltage being dropped across the zener diode ZD, and this is supplied via the conductors 3 and 4 to a timer unit ZE as a supply voltage UH. When the switching voltage U is applied, the timer unit ZE starts to operate and, after an adjustable time which is greater than the switching-on time of the relay that is being used, opens the switch SCH via a link 5. Since the switch SCH Since the switch SCH is open, the constant current IK2 from the constant current source KS2 can no longer flow. Rather, the constant current IK1 from the constant current source KS1 flows through the field coil SP of the relay, as a holding current. This means that, once the switching-on process has been completed, the holding current is applied to the field coil SP and, in this case, this holding current is half the relay switching-on current.

Thus, during the switching-on process, the constant current IK1 from the constant current source KS1 and the constant current IK2 from the constant current source KS2 flow through the relay with the field coil SP. After completion of the switching-on process, the constant current IK1 from the constant current source KS1 flows through the relay. The magnitude of the currents IK1 and IK2 is governed by the constant current sources KS1 and KS2. Any discrepancies, for example between the coil parameters and their nominal values, do not influence the magnitude of the currents.

Since the currents IK1 and IK2 which are present are constant, the voltage drops across the field coil SP of the relay and across the zener diode ZD are also constant. If the circuit arrangement is operated with switching voltages U of different magnitude, then the difference between the switching voltage U and the voltage drops just mentioned is dropped across the constant current sources KS1 and KS2. The circuit arrangement can thus be operated from a switching voltage U which varies within wide limits but without any change to the magnitude of the relay switching-on current or the relay holding current.

Please replace the paragraph beginning line 36 of page 7 with the following rewritten paragraph:

The switching voltage is likewise applied to the circuit arrangement in the time interval between the times t2 and t3. The timer unit switches off the switch SCH at the

time t2, and the current IK1, which forms the holding current HS, flows through the relay, as the coil current ISP.

Please replace the paragraph beginning line 8 of page 8 with the following rewritten paragraph:

The circuit can drive a relay reliably over a wide temperature range, since the constant current sources KS1 and KS2 provide the constant currents IK1 and IK2 irrespective of the temperature level. Temperature-dependent changes in the resistance of the field coil SP likewise do not influence the current levels. Since the constant holding current during the holding period of the relay is less than the constant switching-on current (for example half of it), the circuit arrangement requires a fraction (for example approximately half) of the energy which would be required for operation just with a current of the same magnitude as the switching-on current. The power losses are reduced, the thermal loads on the relay are reduced, and the life of the relay coil is increased.

In the Claims:

What is claimed is:

1. (Amended) A circuit arrangement for operation of a relay, comprising a single voltage at which a relay switching-on current is provided for a time which is predetermined by the timer unit, and at which a relay holding current, which is less than the relay switching-on current, is provided for a subsequent holding period, wherein

the single voltage is a switching voltage, and

the relay switching-on current and the relay holding current are constant currents, which are supplied from at least one constant current source which is fed by the switching voltage.

2. (Amended) The circuit arrangement as claimed in claim 1, wherein a constant current source, whose constant current magnitude is variable, supplies both the relay switching-on current and the relay holding current.

3. (Amended) The circuit arrangement as claimed in claim 1, wherein

a first constant current source provides the relay holding current during the time which is predetermined by the timer unit and during the subsequent holding period, and

a second constant current source provides a constant current, which is superimposed on the relay holding current in order to form the relay switching-on current, during the time which is predetermined by the timer unit.

4. (Amended) The circuit arrangement as claimed in claim 3, wherein a switch, which is located in a current path of the constant current provided by the second constant current source, and is closed during the time which is predetermined by the timer unit.

5. (Amended) The circuit arrangement as claimed in claim 1, wherein an auxiliary voltage, for operation of the timer unit, is dropped across at least one electrical component which is connected in series with one of the constant current sources.

6. (Amended) The circuit arrangement as claimed in claim 4, wherein an auxiliary voltage for operation of the switch is dropped across at least one electrical component which is connected in series with one of the constant current sources.

7. (Amended) The circuit arrangement as claimed in claim 5, wherein the electrical component is a resistor.

8. (Amended) The circuit arrangement as claimed in claim 5, wherein the electrical component is a zener diode.

9. (Amended) The circuit arrangement as claimed in claim 5, wherein the electrical components are series-connected diodes.

10. (Amended) The circuit arrangement as claimed in claim 1, wherein the two constant current sources provide constant currents of equal magnitude.

Please add the following new claims:

11. (New) The circuit arrangement as claimed in claim 6, wherein the electrical component is a resistor.

12. (New) The circuit arrangement as claimed in claim 6, wherein the electrical component is a zener diode.

13. (New) The circuit arrangement as claimed in claim 6, wherein the electrical components are series-connected diodes.

In the Abstract:

Please replace the Abstract with the substitute Abstract attached hereto.

REMARKS

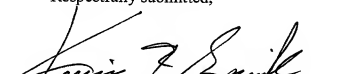
The above amendments to the specification, claims, and abstract have been made to place the application in proper U.S. format and to conform with proper grammatical and idiomatic English. None of the amendments herein are made for reasons related to patentability. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 449122023500. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: February 13, 2002



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

For the convenience of the Examiner, the changes made are shown below with deleted text in strikethrough and added text in underline.

In the Specification:

Page 1 before the first paragraph, please delete the following:

~~Description~~

Page 1, between lines 4 and 5, please insert the following headings and paragraph:

CLAIM FOR PRIORITY

This application claims priority to International Application No. PCT/DE00/02436 which was published in the German language on July 19, 2000.

TECHNICAL FIELD OF THE INVENTION

Please replace the paragraph beginning line 5 of page 1 with the following rewritten paragraph:

The invention relates to a circuit arrangement for operation of a relay, and in particular, to a current having a timer unit which provides a relay switching-on current for a time which is predetermined by the timer unit, and which provides a relay holding current, which is less than the relay switching-on current for a subsequent holding period.

Page 1, between lines 11 and 12, please insert the following heading:

BACKGROUND OF THE INVENTION

Please replace the paragraph beginning line 12 of page 1 with the following rewritten paragraph:

~~A circuit arrangement such as this is specified in US Patent Specification~~ U.S. Patent No. 5,107,391 discloses a circuit arrangement in which the current. ~~Here, the current which flows~~ flowing through at least one relay (~~that is to say through~~ i.e. its field coil) is controlled by means of an electronic switch in the form of a field-effect transistor. When it is switched on, the relay is supplied with a holding current throughout its holding period. The magnitude of the holding current is governed by the duty ratio of electrical

pulses which drive the electronic switch. The temperature of the relay is measured by means of a temperature sensor, and the voltage which is applied to the field coil of the relay is measured by means of a voltage sensor. These measurement variables, as well as information which is stored in a function memory and relates to the nominal values of the relay, are used to define the duty ratio of the pulses, and thus to define the magnitude of the holding current. The relay nominal values must therefore be known ~~for operation of~~ in order to properly operate the circuit. A voltage change which occurs on the field coil of the relay is used to identify that the relay has been switched on, and causes a timer unit to be started. This timer unit uses a continuous pulse to switch on the electronic switch, so that a switching-on current flows which is sufficient to ensure that the relay is switched on. Once the time which is predetermined by the timer unit, and which must be longer than the time required for the relay that is being used to be switched on has elapsed, the continuous pulse ends, and ~~only~~ the holding current, which is governed by the duty ratio of the pulses, still flows through the relay.

Page 2, between lines 27 and 28, please insert the following heading:

SUMMARY OF THE INVENTION

Please replace the consecutive paragraphs beginning at line 28 of page 2 with the following rewritten paragraphs:

~~The~~ One embodiment of the invention ~~is based on the object of specifying~~ discloses a circuit arrangement for operation of a relay~~, in which discrepancies.~~ Discrepancies in the relay from its nominal values have no effect on the magnitude of the switching-on current and holding current, and need not be taken into account with regard to the ~~sizes~~ size of the components in the circuit. Furthermore, it ~~should be~~ is possible to use the circuit, with one and the same relay, from operating voltages of different magnitude.

~~In the case of a circuit arrangement of the type mentioned initially, this object is achieved according to the invention in that~~ In this embodiment, the relay switching-on current and the relay holding current are constant currents, which are supplied from at least one constant current source. A constant current is thus used both as the relay switching-on current and as the relay holding current, whose magnitude is not influenced either by discrepancies in the relay from its nominal values or by operation of the circuit arrangement from operating voltages of different magnitude.

Please replace the consecutive paragraphs beginning at line 24 of page 3 with the following rewritten paragraphs:

~~The~~ In another embodiment of the invention, the circuit arrangement includes, for example, ~~can also be designed such that~~ a first constant current source which provides the relay holding current during the time which is predetermined by the timer unit and during the subsequent holding period, and ~~in that~~ a second constant current source which provides a constant current, which is superimposed on the relay holding current in order to form the relay switching-on current, during the time which is predetermined by the timer unit. This has the advantage that relatively simple constant current sources can be used, whose constant currents need not be variable.

~~A~~ In one aspect of the invention, a switch, which is closed during the time that is predetermined by the timer unit, can advantageously be located in the current path of the constant current provided by the second constant current source. Once this time has elapsed, the switch is opened, thus making it easy to switch between the relay switching-on current and the relay holding current.

~~The~~ In another aspect of the invention, the timer unit and/or the switch may require an auxiliary voltage. A voltage drop across at least one electrical component that is connected in series with one of the constant current sources can advantageously be used for this auxiliary voltage.

~~By way of example~~ In one embodiment, a resistor may be used as the electrical component. Since the current flowing through the resistor is constant, the voltage which is dropped across this resistor is also constant, and may be used as an auxiliary voltage.

~~A~~ In another embodiment, a zener diode can ~~likewise~~ advantageously be used as the electrical component. A zener diode has the advantage that the voltage drop which occurs across it is constant even when the current flowing through the zener diode changes. By way of example, a situation may arise during operation of a relay which requires a change to the switching-on current and/or holding current, and hence appropriate changes to the constant currents. The advantage just mentioned is also applicable when series-connected diodes are used as electrical components.

Page 4, between lines 35 and 36, please insert the following heading:

BRIEF DESCRIPTION OF THE DRAWINGS

Please replace the paragraph beginning line 36 of page 4 with the following rewritten paragraph:

~~For further explanation:~~

Figure 1 shows an exemplary embodiment of a circuit arrangement according to the invention for operation of a relay~~, and~~.

Figure 2 shows a diagram of the state of elements in the circuit arrangement, plotted against time.

Page 5, between lines 6 and 7, please insert the following heading:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please replace the consecutive paragraphs beginning line 7 of page 5 with the following rewritten paragraphs:

The circuit arrangement 1 illustrated in Figure 1 for operation of a relay is connected in series with a field coil SP of a relay~~; a.~~ A voltage U is applied to the series circuit. The voltage U is a switching voltage, that is to say application of the voltage U is intended to cause the relay to switch. At the same time, the voltage U is used as the operating voltage for the circuit arrangement and the relay. As long as no switching voltage U is applied, the circuit arrangement is in a quiescent state with no current flowing, and a switch SCH is closed.

When the switching voltage U is applied, the circuit arrangement starts to operate. A constant current source KS1 drives a constant current IK1 through a zener diode ZD and through the field coil SP of the relay. Since the switch SCH is closed, a constant current source KS2 also drives a constant current IK2 through the switch. This current is added to the constant current IK1 at a node 2; a current whose magnitude is (IK1 + IK2) flows, as a coil current ISP, through the field coil SP of the relay. The constant current source KS1 is designed such that it supplies a constant holding current. The constant current source KS2 supplies the difference to make up the necessary switching-on current for the relay; in this case, the difference is of precisely the same magnitude as the relay holding current. The switching-on current now flows through the field coil SP of the relay and the relay pulls in, that is to say it switches. The constant current IK1 which is flowing through the zener diode ZD results in an auxiliary voltage being dropped across the zener diode ZD, and this is supplied via the conductors 3 and 4 to a timer unit ZE as a supply voltage UH. When the switching voltage U is applied, the timer unit ZE starts to operate and, after an adjustable time which ~~must be~~ is greater than the switching-on time of the relay that is

being used, opens the switch SCH via a link 5. Since the switch SCH Since the switch SCH is open, the constant current IK2 from the constant current source KS2 can no longer flow~~; only~~. Rather, the constant current IK1 from the constant current source KS1 ~~now still~~ flows through the field coil SP of the relay, as a holding current. This means that, once the switching-on process has been completed, ~~only~~ the holding current is ~~still~~ applied to the field coil SP and, in this case, this holding current is half the relay switching-on current.

Thus, during the switching-on process, the constant current IK1 from the constant current source KS1 and the constant current IK2 from the constant current source KS2 flow through the relay with the field coil SP. After completion of the switching-on process, ~~only~~ the constant current IK1 from the constant current source KS1 ~~still~~ flows through the relay. The magnitude of the currents IK1 and IK2 is governed by the constant current sources KS1 and KS2~~; any~~. Any discrepancies, for example between the coil parameters and their nominal values, ~~have no~~ do not influence ~~on~~ the magnitude of the currents.

Since the currents IK1 and IK2 which are present are constant, the voltage drops across the field coil SP of the relay and across the zener diode ZD are also constant. If the circuit arrangement is operated with switching voltages U of different magnitude, then the difference between the switching voltage U and the voltage drops just mentioned is dropped across the constant current sources KS1 and KS2. ~~It is thus possible to operate t~~The circuit arrangement can thus be operated from a switching voltage U which varies within wide limits but without any change to the magnitude of the relay switching-on current or the relay holding current.

Please replace the paragraph beginning line 36 of page 7 with the following rewritten paragraph:

The switching voltage is likewise applied to the circuit arrangement in the time interval between the times t2 and t3. The timer unit switches off the switch SCH at the time t2, and ~~only~~ the current IK1, which forms the holding current HS, ~~still~~ flows through the relay, as the coil current ISP.

Please replace the paragraph beginning line 8 of page 8 with the following rewritten paragraph:

The circuit can drive a relay reliably over a wide temperature range, since the constant current sources KS1 and KS2 provide the constant currents IK1 and IK2

irrespective of the temperature level. Temperature-dependent changes in the resistance of the field coil SP likewise ~~have no~~ do not influence ~~on~~ the current levels. Since the constant holding current during the holding period of the relay is less than the constant switching-on current (for example half of it), the circuit arrangement requires ~~only~~ a fraction (for example approximately half) of the energy which would be required for operation just with a current of the same magnitude as the switching-on current. The power losses are reduced, the thermal loads on the relay are reduced, and the life of the relay coil is increased.

In the Claims:

~~Patent Claims~~

What is claimed is:

1. (Amended) A circuit arrangement ~~(1)~~ for operation of a relay, comprising ~~having~~ a single voltage at which a relay switching-on current ~~(ES)~~ is provided for a time ~~(At1)~~ which is predetermined by the timer unit ~~(ZE)~~, and at which a relay holding current ~~(HS)~~, which is less than the relay switching-on current ~~(ES)~~, is provided for a subsequent holding period ~~(At2)~~, wherein

~~characterized in that~~

the single voltage is a switching voltage, and ~~that~~

the relay switching-on current ~~(ES)~~ and the relay holding current ~~(HS)~~ are constant currents, which are supplied from at least one constant current source ~~(KS1, KS2)~~ which is fed by the switching voltage.

2. (Amended) The circuit arrangement as claimed in claim 1, wherein ~~characterized in that~~

a constant current source, whose constant current magnitude is variable, supplies both the relay switching-on current ~~(ES)~~ and the relay holding current ~~(HS)~~.

3. (Amended) The circuit arrangement as claimed in claim 1, wherein ~~characterized in that~~

a first constant current source ~~(KS1)~~ provides the relay holding current ~~(HS)~~ during the time ~~(At1)~~ which is predetermined by the timer unit ~~(ZE)~~ and during the subsequent holding period ~~(At2)~~, and

~~in that~~ a second constant current source ~~(KS2)~~ provides a constant current ~~(IK2)~~, which is superimposed on the relay holding current ~~(HS)~~ in order to form the relay

switching-on current ~~(ES)~~, during the time ~~(At1)~~ which is predetermined by the timer unit ~~(ZE)~~.

4. (Amended) The circuit arrangement as claimed in claim 3, wherein ~~characterized by~~ a switch ~~(SCH)~~, which is located in ~~the~~ a current path of the constant current ~~(IK2)~~ provided by the second constant current source ~~(KS2)~~, and is closed during the time ~~(t1)~~ which is predetermined by the timer unit ~~(ZE)~~.

5. (Amended) The circuit arrangement as claimed in ~~one of claims 1 to 4, characterized in that~~ claim 1, wherein

an auxiliary voltage ~~(UH)~~, for operation of the timer unit ~~(ZE)~~, is dropped across at least one electrical component which is connected in series with one of the constant current sources ~~(KS1, KS2)~~.

6. (Amended) The circuit arrangement as claimed in claim 4, wherein ~~characterized in that~~
an auxiliary voltage ~~(UH)~~ for operation of the switch ~~(SCH)~~ is dropped across at least one electrical component which is connected in series with one of the constant current sources ~~(KS1, KS2)~~.

7. (Amended) The circuit arrangement as claimed in claim 5 ~~or 6~~, wherein ~~characterized in that~~
the electrical component is a resistor.

8. (Amended) The circuit arrangement as claimed in claim 5 ~~or 6~~, wherein ~~characterized in that~~
the electrical component is a zener diode ~~(ZD)~~.

9. (Amended) The circuit arrangement as claimed in claim 5 ~~or 6~~, wherein ~~characterized in that~~
the electrical components are series-connected diodes.

10. (Amended) The circuit arrangement as claimed in ~~one of claims 3 to 9, characterized in that~~ claim 1, wherein

the two constant current sources ~~(KS1, KS2)~~ provide constant currents ~~(IK1, IK2)~~ of equal magnitude.

Please add the following new claims:

11. (New) The circuit arrangement as claimed in claim 6, wherein the electrical component is a resistor.

12. (New) The circuit arrangement as claimed in claim 6, wherein the electrical component is a zener diode.

13. (New) The circuit arrangement as claimed in claim 6, wherein the electrical components are series-connected diodes.

In the Abstract:

Please replace the Abstract with the substitute Abstract attached hereto.

CIRCUIT ARRANGEMENT FOR OPERATION OF A RELAY

Abstract

The invention relates to a circuit arrangement for operation of a relay which provides a switching-on current for the field coil of the relay and subsequently, after a predetermined time, a holding current. In order that any possible discrepancies in the parameters of the relay from their nominal values have no negative influence and need not be taken into account when designing the circuit, and in order that the circuit arrangement can be used with operating voltages of different magnitude, at least one constant current source supplies the relay switching-on current and the relay holding current.

Description

Circuit arrangement for operation of a relay

The invention relates to a circuit arrangement for operation of a relay, having a timer unit which provides a relay switching-on current for a time which is predetermined by the timer unit, and which provides a relay holding current, which is less than the relay switching-on current for a subsequent holding period.

A circuit arrangement such as this is specified in US Patent Specification 5,107,391. Here, the current which flows through at least one relay (that is to say through its field coil) is controlled by means of an electronic switch in the form of a field-effect transistor. When it is switched on, the relay is supplied with a holding current throughout its holding period. The magnitude of the holding current is governed by the duty ratio of electrical pulses which drive the electronic switch. The temperature of the relay is measured by means of a temperature sensor, and the voltage which is applied to the field coil of the relay is measured by means of a voltage sensor. These measurement variables as well as information which is stored in a function memory and relates to the nominal values of the relay are used to define the duty ratio of the pulses, and thus to define the magnitude of the holding current. The relay nominal values must therefore be known for operation of the circuit. A voltage change which occurs on the field coil of the relay is used to identify that the relay has been switched on, and causes a timer unit to be started. This timer unit uses a continuous pulse to switch on the electronic switch, so that a switching-on current flows which is sufficient to ensure that the relay is switched on. Once the time which is predetermined by the timer unit, and which must be longer than the time

required for the relay that is being used to be switched on has elapsed, the continuous pulse ends, and only the holding current, which is governed by the duty ratio of the pulses, still flows through the relay.

In order to ensure that a sufficient holding current flows to hold the relay in the switched-on state, the circuit takes account of the voltage across the field coil, the temperature and the nominal values for the relay. Individual discrepancies from the nominal values for the relay, in particular discrepancies in the coil resistance, are ignored, however. Discrepancies such as these can occur, for example, during the manufacture of the relay, due to aging processes during operation, or due to oxidation of conductors and contacts of the field coil.

Furthermore, although the circuit is able to take account of fluctuations in the operating voltage by measuring the voltage across the field coil of the relay, the circuit is, however, intended for operation from a voltage source with a predetermined nominal voltage, for example from a motor vehicle battery with a voltage of 12 V. Circuits with components of different sizes are therefore required to operate relays from different operating voltages.

The invention is based on the object of specifying a circuit arrangement for operation of a relay, in which discrepancies in the relay from its nominal values have no effect on the magnitude of the switching-on current and holding current, and need not be taken into account with regard to the sizes of the components in the circuit. Furthermore, it should be possible to use the circuit, with one and the same relay, from operating voltages of different magnitude.

In the case of a circuit arrangement of the type mentioned initially, this object is achieved according to the invention in that
the relay switching-on current and the relay holding current are constant currents, which are supplied from at least one constant current source. A constant current is thus used both as the relay switching-on current and as the relay holding current, whose magnitude is not influenced either by discrepancies in the relay from its nominal values or by operation of the circuit arrangement from operating voltages of different magnitude.

A constant current source whose constant current magnitude is variable can be used to supply the constant relay switching-on current and the constant, lower relay holding current. The constant current source supplies the relay switching-on current from the start of the switching-on process. Once the relay has been switched on and the time which is predetermined by the timer unit has elapsed, the constant current is reduced to the relay holding current.

The circuit arrangement can also be designed such that a first constant current source provides the relay holding current during the time which is predetermined by the timer unit and during the subsequent holding period, and in that a second constant current source provides a constant current, which is superimposed on the relay holding current in order to form the relay switching-on current, during the time which is predetermined by the timer unit. This has the advantage that relatively simple constant current sources can be used, whose constant currents need not be variable.

A switch, which is closed during the time that is predetermined by the timer unit, can advantageously be located in the current path of the constant current

provided by the second constant current source. Once this time has elapsed, the switch is opened, thus making it easy to switch between the relay switching-on current and the relay holding current.

The timer unit and/or the switch may require an auxiliary voltage. A voltage drop across at least one electrical component that is connected in series with one of the constant current sources can advantageously be used for this auxiliary voltage.

By way of example, a resistor may be used as the electrical component. Since the current flowing through the resistor is constant, the voltage which is dropped across this resistor is also constant, and may be used as an auxiliary voltage.

A zener diode can likewise advantageously be used as the electrical component. A zener diode has the advantage that the voltage drop which occurs across it is constant even when the current flowing through the zener diode changes. By way of example, a situation may arise during operation of a relay which requires a change to the switching-on current and/or holding current, and hence appropriate changes to the constant currents. The advantage just mentioned is also applicable when series-connected diodes are used as electrical components.

In the circuit arrangement according to the invention, both constant current sources may, for example, supply a constant current of the same magnitude. In this case, the relay switching-on current is twice the magnitude of the relay holding current.

For further explanation:

Figure 1 shows an exemplary embodiment of a circuit arrangement according to the invention for operation of a relay, and

Figure 2 shows a diagram of the state of elements in the circuit arrangement, plotted against time.

The circuit arrangement 1 illustrated in Figure 1 for operation of a relay is connected in series with a field coil SP of a relay; a voltage U is applied to the series circuit. The voltage U is a switching voltage, that is to say application of the voltage U is intended to cause the relay to switch. At the same time, the voltage U is used as the operating voltage for the circuit arrangement and the relay. As long as no switching voltage U is applied, the circuit arrangement is in a quiescent state with no current flowing, and a switch SCH is closed.

When the switching voltage U is applied, the circuit arrangement starts to operate. A constant current source KS1 drives a constant current IK1 through a zener diode ZD and through the field coil SP of the relay. Since the switch SCH is closed, a constant current source KS2 also drives a constant current IK2 through the switch. This current is added to the constant current IK1 at a node 2; a current whose magnitude is (IK1 + IK2) flows, as a coil current ISP, through the field coil SP of the relay. The constant current source KS1 is designed such that it supplies a constant holding current. The constant current source KS2 supplies the difference to make up the necessary switching-on current for the relay; in this case, the difference is of precisely the same magnitude as the relay holding current. The switching-on current now flows through the field coil SP of the relay and the relay pulls in, that is to say it switches. The constant current IK1 which is flowing through the zener diode ZD results in an auxiliary voltage being dropped

across the zener diode ZD, and this is supplied via the conductors 3 and 4 to a timer unit ZE as a supply voltage UH. When the switching voltage U is applied, the timer unit ZE starts to operate and, after an adjustable time which must be greater than the switching-on time of the relay that is being used, opens the switch SCH via a link 5. Since the switch SCH Since the switch SCH is open, the constant current IK2 from the constant current source KS2 can no longer flow; only the constant current IK1 from the constant current source KS1 now still flows through the field coil SP of the relay, as a holding current. This means that, once the switching-on process has been completed, only the holding current is still applied to the field coil SP and, in this case, this holding current is half the relay switching-on current.

Thus, during the switching-on process, the constant current IK1 from the constant current source KS1 and the constant current IK2 from the constant current source KS2 flow through the relay with the field coil SP. After completion of the switching-on process, only the constant current IK1 from the constant current source KS1 still flows through the relay. The magnitude of the currents IK1 and IK2 is governed by the constant current sources KS1 and KS2; any discrepancies, for example between the coil parameters and their nominal values, have no influence on the magnitude of the currents.

Since the currents IK1 and IK2 which are present are constant, the voltage drops across the field coil SP of the relay and across the zener diode ZD are also constant. If the circuit arrangement is operated with switching voltages U of different magnitude, then the difference between the switching voltage U and the voltage drops just mentioned is dropped across the constant current sources KS1 and KS2. It is thus

possible to operate the circuit arrangement from a switching voltage U which varies within wide limits but without any change to the magnitude of the relay switching-on current or the relay holding current.

When the circuit is disconnected from the switching voltage U, the circuit changes back to its quiescent state, with no current flowing. The timer unit ZE is reset, and the switch SCH is closed. The relay changes back to its quiescent position. Immediately after completion of these processes, the circuit can be actuated by applying a switching voltage U once again.

The state of the switching voltage U is shown at the top of the diagram in Figure 2, with the state of the output from the timer unit ZE being shown underneath this, followed by the state of the switch SCH and, underneath this, the profile of the coil current ISP, plotted against time. Three times t1, t2 and t3 are marked on a horizontal time axis. The switching voltage U is applied to the circuit arrangement at the time t1; the time (t1), which is predetermined by the timer unit ZE, lapses at the time t2, and the circuit arrangement is disconnected from the switching voltage U once again at the time t3.

During the time interval between the times t1 and t2, the switching voltage U is applied to the circuit arrangement, the timer unit is operating, and the time which is predetermined by the timer unit is counting down; the switch is switched on, and a coil current ISP, which is composed of the sum of the constant currents IK1 and IK2, flows through the relay. This coil current is the switching-on current ES.

The switching voltage is likewise applied to the circuit arrangement in the time interval between the times t2 and t3. The timer unit switches off the switch

SCH at the time t2, and only the current IK1, which forms the holding current HS, still flows through the relay, as the coil current ISP.

The circuit is in the quiescent state, with no current flowing, at times before t1 and at times after t3.

The circuit can drive a relay reliably over a wide temperature range, since the constant current sources KS1 and KS2 provide the constant currents IK1 and IK2 irrespective of the temperature level. Temperature-dependent changes in the resistance of the field coil SP likewise have no influence on the current levels. Since the constant holding current during the holding period of the relay is less than the constant switching-on current (for example half of it), the circuit arrangement requires only a fraction (for example approximately half) of the energy which would be required for operation just with a current of the same magnitude as the switching-on current. The power losses are reduced, the thermal loads on the relay are reduced, and the life of the relay coil is increased.

Patent claims

1. A circuit arrangement (1) for operation of a relay, having a single voltage at which a relay switching-on current (ES) is provided for a time (Δt1) which is predetermined by the timer unit (ZE), and at which a relay holding current (HS), which is less than the relay switching-on current (ES), is provided for a subsequent holding period (Δt2),
characterized in that
- the single voltage is a switching voltage and that
- the relay switching-on current (ES) and the relay holding current (HS) are constant currents, which are supplied from at least one constant current source (KS1, KS2) which is fed by the switching voltage.

2. The circuit arrangement as claimed in claim 1, characterized in that
a constant current source, whose constant current magnitude is variable, supplies both the relay switching-on current (ES) and the relay holding current (HS).

3. The circuit arrangement as claimed in claim 1, characterized in that
a first constant current source (KS1) provides the relay holding current (HS) during the time (Δt1) which is predetermined by the timer unit (ZE) and during the subsequent holding period (Δt2), and in that a second constant current source (KS2) provides a constant current (IK2), which is superimposed on the relay holding current (HS) in order to form the relay switching-on current (ES), during the time (Δt1) which is predetermined by the timer unit (ZE).

4. The circuit arrangement as claimed in claim 3, characterized by a switch (SCH), which is located in the current path of the constant current (IK2) provided by the second constant current source (KS2), and is closed during the time (t1) which is predetermined by the timer unit (ZE).

AMENDED SHEET

5. The circuit arrangement as claimed in one of claims 1 to 4,
characterized in that
an auxiliary voltage (UH), for operation of the timer unit (ZE), is dropped across at least one electrical component which is connected in series with one of the constant current sources (KS1, KS2).

6. The circuit arrangement as claimed in claim 4,
characterized in that
an auxiliary voltage (UH) for operation of the switch (SCH) is dropped across at least one electrical component which is connected in series with one of the constant current sources (KS1, KS2).

7. The circuit arrangement as claimed in claim 5 or 6,
characterized in that
the electrical component is a resistor.

8. The circuit arrangement as claimed in claim 5 or 6,
characterized in that
the electrical component is a zener diode (ZD).

9. The circuit arrangement as claimed in claim 5 or 6,
characterized in that
the electrical components are series-connected diodes.

10. The circuit arrangement as claimed in one of claims 3 to 9,
characterized in that
the two constant current sources (KS1, KS2) provide constant currents (IK1, IK2) of equal magnitude.

Abstract

Circuit arrangement for operation of a relay

The invention relates to a circuit arrangement (1) for operation of a relay which provides a switching-on current (ES) for the field coil (SP) of the relay and subsequently, after a predetermined time (t1), a holding current (HS). In order that any possible discrepancies in the parameters of the relay from their nominal values have no negative influence and need not be taken into account when designing the circuit, and in order that the circuit arrangement can be used with operating voltages (U) of different magnitude, at least one constant current source (KS1, KS2) supplies the relay switching-on current (ES) and the relay holding current (HS).

FIGURE 1

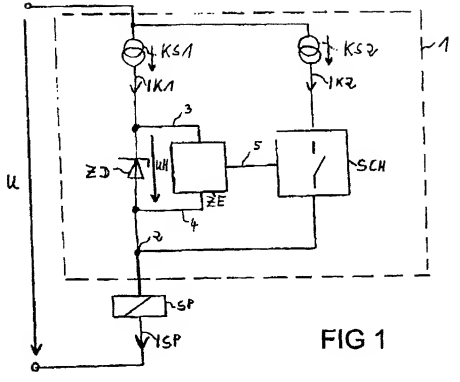

FIG 1

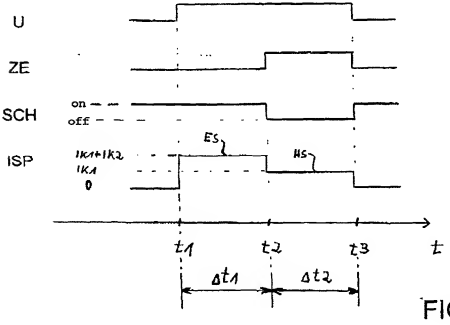

FIG 2

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

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My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Schaltungsanordnung zum Betrieb eines Relais

CIRCUIT ARRANGEMENT FOR OPERATING A RELAY

deren Beschreibung

(zutreffendes ankreuzen)
☐ hier beigefügt ist.
☒ am 19. Juli 2000als
PCT internationale Anmeldung
PCT Anmeldungsnummer _______
eingereicht wurde und am _______
abgeändert wurde (falls tatsächlich abgeändert).

the specification of which

(check one)
☐ is attached hereto.
☒ was filed on _________ as
PCT international application
PCT Application No. ____________
and was amended on ____________
(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
19939650.7 (Number) (Nummer)	DE (Country) (Land)	1999.08.13 (Day Month Year Filed) (Tag Monat Jahr eingereicht)	☒ Yes Ja	☐ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	☐ Yes Ja	☐ No Nein
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	☐ Yes Ja	☐ No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/02436 (Application Serial No.) (Anmeldeseriennummer)	19. Juli 2000 (Filing Date D, M, Y) (Anmeldedatum T, M, J)	anhängig (Status) (patentiert, anhängig, aufgegeben)	pending (Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date D,M,Y) (Anmeldedatum T, M; J)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

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Send Correspondence to:

Morrison and Foerster LLP
2000 Pennsylvania Ave., NW 20006-1888 Washington, DC
Telephone: (001) 202 887 1500 and Facsimile (001) 202 887 0763
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Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor:
Martin Rossbach	Martin Rossbach
Unterschrift des Erfinders / Datum	Inventor's signature / Date
06.02.02	06.02.02
Wohnsitz	Residence
Nuernberg, Deutschland	Nuernberg, Germany
Staatsangehörigkeit	Citizenship
Deutsch	German
Postanschrift	Post Office Addess
Wertheimer Str.3	Wertheimer Str.3
90427 Nuernberg Deutschland	90427 Nuernberg Germany
Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders / Datum	Second Inventor's signature / Date
Wohnsitz	Residence
,	,
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).